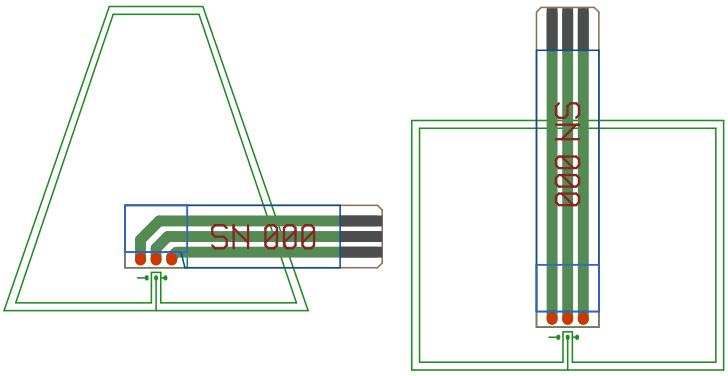
MSL RAD Sensor Head
PIN Detector Mount Flex Stips

Stephan I. Böttcher

v01: October 13, 2006



The single pixel PIN detectors of the RAD instrument will be connected via small flex strips to the preamplifier electronics.

One end of the strip has a square rigid base, which will be glued onto the surface of the detector. Three contacts of the detector will be wirebonded to gold pads on the flex strip.

The other end of the strip will be glued onto the edge of an electronics board, and small wire bridges soldered from the strip to the electronics board will provide electrical contact.

The end of the strip fits into a flex strip connector with 1 mm contact pitch. The tranport trays for the detectors will be equipped with such a connector, such that the detectors can be tested while contained inside the tray.

The strips are 4 mm wide. The square base is $4 \times 4\,\mathrm{mm}^2$. For the neutron channel and bottom anticoincidence readout (E and F detectors) the strip will be 20.5 mm long, with straight traces. The CsI readout (D detectors) strips are 16.5 mm long, turning 90 deg to the right from the bond pads.

1 Fabrication

The board shall be made according to IPC 6013 class 3 standards.

1.1 Material

The flex strips shall be made of polyimide film. The rigid base, shall be polyimide glass (No-Flow-Preprq) material. Copper thickness 17 μm. Surface finish for both the solder pads and bond pads chem. Nickel/Gold.

1.2 Quantity

We will need 30 D-strips, and 60 E/F-strips, including spares.

Each detector shall be identified by a unique three digit serial number, which shall be printed on the insulating film on top of the flexible strip.

There is no requirement for continuous numbers. Strips of different type may share a number. The serial number of the first order of strips shall start at 001. Later orders will start with a number larger than the last used number, preferably starting at a multiple of 100.

1.3 Design Rules

The copper traces are 0.7 mm wide, at a pitch of 1 mm.

1.4 Layers

The design provides Gerber layers for each Capton outline, the copper trace layer, serial number, the bond pads, and for the solder pads. The layer order is defined in the following table.

	Material	Thickness			Gerber file
1	printing		serial number		`*.group0.gbr`
3	LFO 110	50 μm	flex insulation		`*.group2.gbr`
4a	ch. Ni/Au		wirebond pads		`*.group3.gbr`
4b	ch. Ni/Au		solder pads		`*.frontpaste.gbr`
5	Cu	17 μm	copper routing		`*.group4.gbr`
6	PI film	50 μm	flex strip		`*.group5.gbr`
7	2×106	120 μm	rigid base		`*.group6.gbr`

1.5 Layout

There is a design file for the E/F-strips (Fig. 1) and another one for the D-strips (Fig. 2). Fig. 3 shows the designs in true size.

The gerber files for the D-strips are named `F16_v01.*.gbr`. The gerber files for the E/F-strips are named `F20_v01.*.gbr`.

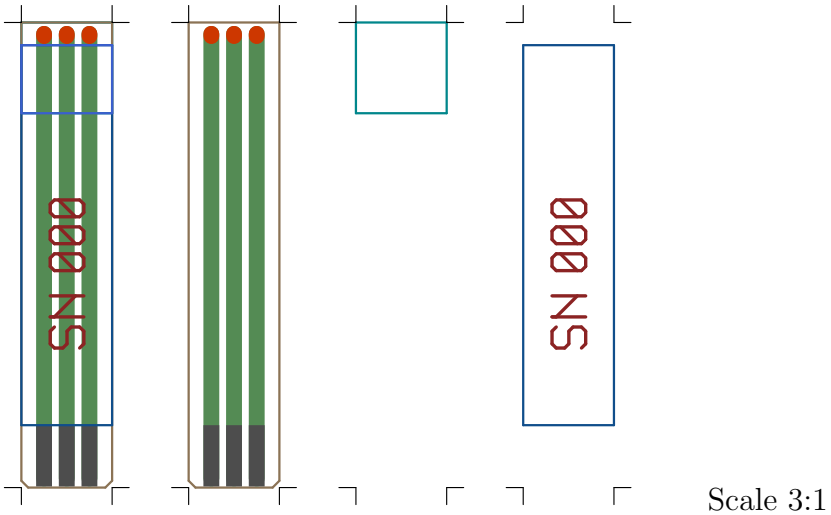


Figure 1: Detector E/F strips: five layer views enlarged to page size. 1. overview, 2. flex layer, 3. rigid base, 4. rigid top, 5. strip insulation.

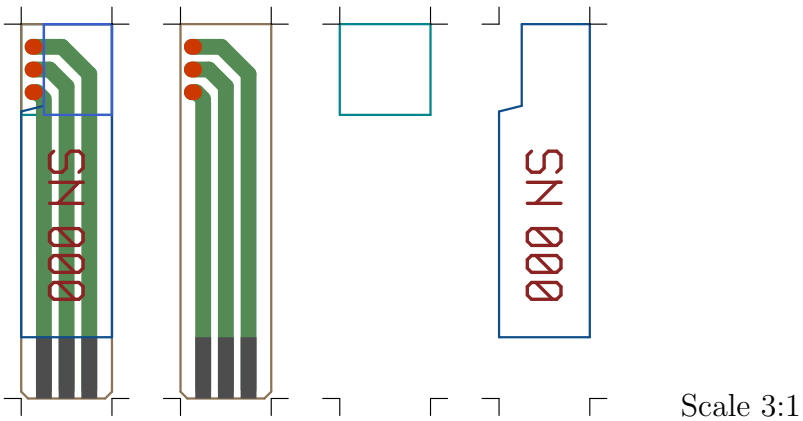


Figure 2: Detector D strips: five layer views enlarged to page size. 1. overview, 2. flex layer, 3. rigid base, 4. strip insulation.

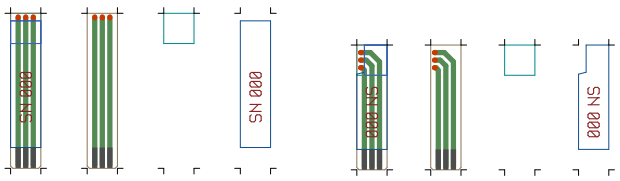


Figure 3: Detector strips, actual size